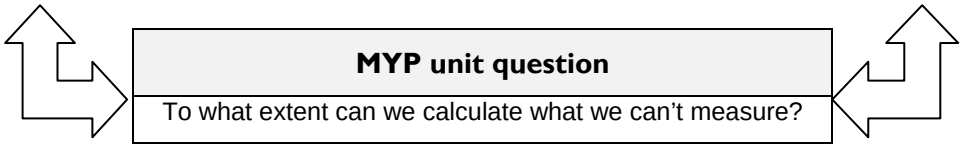
MYP unit planner

Unit title	**Trigonometry**
Teacher(s)	
Subject and grade level	Mathematics - MYP5
Time frame and duration	10 to 12 lessons

Stage 1: Integrate significant concept, area of interaction and unit question

Area of interaction focus Which area of interaction will be our focus? Why have we chosen this?	**Significant concept(s)** What are the big ideas? What do we want our students to retain for years into the future?
Human Ingenuity: Rules discovered to allow people to calculate what they can't measure.	Exploration allows us to discover the unknown



MYP unit question
To what extent can we calculate what we can't measure?

Assessment What task(s) will allow students the opportunity to respond to the unit question? What will constitute acceptable evidence of understanding? How will students show what they have understood?
Topic test including basic skills and operations and including real-life problems about tide modelling. Investigating patterns: the cosine rule Reflection in Mathematics: the height of a building Reflection in Mathematics: modelling the relationship between time and height of water in Australia
Which specific MYP objectives will be addressed during this unit?

A Knowledge and understanding

Know and demonstrate understanding of the concepts from the branches of mathematics (number, algebra, geometry and trigonometry)
Use appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts
Select and apply general rules correctly to solve problems including those in real-life contexts

B Investigating patterns

Select and apply appropriate inquiry and mathematical problem-solving techniques
Recognise patterns
Describe patterns as relationships or general rules
Draw conclusions consistent with findings
Justify or prove mathematical relationships and general rules

C Communication in Mathematics

Use appropriate mathematical language (notation, symbols, terminology) in both oral and written explanations
Use different forms of mathematical representation (formulae and models)
Move between different forms of representation

D Reflection in Mathematics

Explain whether their results make sense in the context of the problem
Explain the importance of their findings
Justify the degree of accuracy of their results where appropriate

- Suggest improvements to the method when necessary

Which MYP assessment criteria will be used?

A, B, C and D

Stage 2: Backward planning: from the assessment to the learning activities through inquiry

Content

What knowledge and/or skills (from the course overview) are going to be used to enable the student to respond to the unit question?

What (if any) state, provincial, district, or local standards/skills are to be addressed? How can they be unpacked to develop the significant concept(s) for stage 1?

- Sine rule
- Cosine rule
- Applying sine rule to solve advanced angle of elevation and depression problems
- Applying cosine rule to solve bearing problems
- Applying transformations to sine function
- Modelling tide using sine function

Approaches to learning

How will this unit contribute to the overall development of subject-specific and general approaches to learning skills?

- Knowledge-acquisition skills: understanding of mathematical concepts and ideas
- Problem-solving skills: mathematical strategies to solve problems in familiar and unfamiliar situations, in both mathematical and real-life contexts
- Communication skills: oral and written skills using mathematical language, symbols and notation, and a range of forms of representation (graphs)
- Thinking skills: coherent logical and abstract thinking, inductive and deductive reasoning, justification and proof, estimation and accuracy
- Collaborative skills: the ability to work as a team member, listening and interacting with others, respecting and considering different points of view
- Reflection skills: evaluation of one's own work and performance, identifying personal strengths and weaknesses to improve learning

Learning experiences	Teaching strategies
How will students know what is expected of them? Will they see examples, rubrics, templates? How will students acquire the knowledge and practise the skills required? How will they practise applying these? Do the students have enough prior knowledge? How will we know?	How will we use formative assessment to give students feedback during the unit? What different teaching methodologies will we employ? How are we differentiating teaching and learning for all? How have we made provision for those learning in a language other than their mother tongue? How have we considered those with special educational needs?

	[General note: The lessons below are just a preliminary plan. Depending on the students interactions and interests, changes should be made to allow students to relate to the content] **Lesson 1**
- Students will find they need to learn about trigonometry to be able to solve real-life problems which will help in enhancing their **meaning given motivation**. - Students will solve real-life problem to **apply learning**. - **Co-operative learning**: By working in groups they will interact to share ideas and strategies. - **Differentiated** homework enables students to reach different levels depending on their capabilities and interests. - Working in a competitive environment will make for **stimulating motivation**. - Students will solve the investigation, including in an unfamiliar situation, to enhance their thinking skills.	- Start the unit with the opening problem from a real-life example of having 2 angles and one side (Calculating the height of Barlief hill from the other side of Suez canal). - Knowing 2 angles and one side of a triangle, ask students to calculate the length of another side of the triangle (students will work in groups and compete to see who will be able to calculate the length first. They will make the necessary constructions to be able to make the calculations). - Give two levels of homework. **Lesson 2** - Class sheet from Oxford Dr. Rayner book. Students solve in pairs as a competition until reaching the top of the ladder. - Homework: Investigation task: Cosine rule
- Students will use the stick and scrolled paper method to calculate the height of the building to **apply learning**. - Students will solve a reflection-in-Mathematics task to **enhance their insight** into Mathematics and make more sense of results.	**Lesson 3** - Environmental education activity: calculate the height of the school building from the playground in groups of 4 (each having a role and hence differentiated instructions). - Homework: Reflection task about calculating the height of a four-storey building.
- Students will take notes to enhance their note-taking skills. - Students will brainstorm to enhance their thinking skills. - By completing the class sheets and daily homework students will master their learning (**Mastery learning**).	**Lesson 4** - Discuss the cosine rule and its applications in real-life problems. - [Mastery] Different problems with different levels solved in groups of 4. - Give related homework.
- Students will produce a reflection after the test to consolidate the concepts learned.	**Lesson 5** - Test Criteria A and C, including in unfamiliar situations. Students will then receive feedback and will be asked to reflect on their performance and understanding.
Learning experiences How will students know what is expected of them? Will they see examples, rubrics, templates? How will students acquire the knowledge and practise the skills required? How will they practise applying these? Do the students have enough prior knowledge? How will we know?	**Teaching strategies** How will we use formative assessment to give students feedback during the unit? What different teaching methodologies will we employ? How are we differentiating teaching and learning for all? How have we made provision for those learning in a language other than their mother tongue? How have we considered those with special educational needs?

	Lesson 6
- **Technology in education:** Use of Ti-84 as a graphing tool will make students see how technology can help.	- **Technology in education:** plot the sine function manually then check the shape using Ti 84 as a graphing tool. - Homework: apply transformations on sine function.
	Lesson 7
- Students will find they need to learn about trigonometry to be able to solve real-life problems which will help in enhancing their **meaning given motivation**. - Students will search for data, including wave heights from a bay in Australia, to enhance their literacy skills.	- Discuss parameters and apply to heights of waves in Abu Kir.(http://iodeweb1.vliz.be/odin/bitstream/1834/1449/1/Text.3.pdf) from EGYPTIAN JOURNAL OF AQUATIC RESEARCH **VOL. 32 No. 1**, 2006: 22-33. - Homework: Find data from bay in Australia and compare.
- Students will take notes and compare models from different places in the world to consolidate the unit concepts and work on their international-mindedness.	**Lesson 8** - Discuss differences in parameters between the two models. - Give class sheet from Questionbank. The rest of sheet to be solved at home as homework.
	Lesson 9
- Students will participate in making the unit summary and take notes on it to differentiate between concepts and skills in the unit, and to make sure concepts are clear. - Students will think about whether trigonometry is an invention or discovery to enhance their **thinking skills**.	- Wrap-up the unit with a summary elicited from students. - Discussion about the question: Is trigonometry a discovery or an invention? On another planet will trigonometry exist? What will it look like?
	Lesson 10
- Students will produce a reflection on their performance after the test to enhance the attribute "**reflective**" and consolidate the unit concepts.	Test Criteria A and C including in unfamiliar situations. Student will then receive feedback and will be asked to reflect on their performance and understanding.

Resources

What resources are available to us?

How will our classroom environment, local environment and/or the community be used to facilitate students' experiences during the unit?

- School building and playground used in the activity
- Use of Internet to search for data
- Books:

Oxford Mathematics for Standard level

Oxford Dr Rayner

For practising on real-life problems: Haese and Harris MYP5

IB Questionbank

Ongoing reflections and evaluation

In keeping an ongoing record, consider the following questions. There are further stimulus questions at the end of the "Planning for teaching and learning" section of *MYP: From principles into practice*.

Students and teachers

What did we find compelling? Were our disciplinary knowledge/skills challenged in any way?

What inquiries arose during the learning? What, if any, extension activities arose?

How did we reflect—both on the unit and on our own learning?

Which attributes of the learner profile were encouraged through this unit? What opportunities were there for student-initiated action?

Possible connections

How successful was the collaboration with other teachers within my subject group and from other subject groups?

What interdisciplinary understandings were or could be forged through collaboration with other subjects?

Assessment

Were students able to demonstrate their learning?

How did the assessment tasks allow students to demonstrate the learning objectives identified for this unit? How did I make sure students were invited to achieve at all levels of the criteria descriptors?

Are we prepared for the next stage?

Data collection

How did we decide on the data to collect? Was it useful?